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Teorema de thevenin paso a paso pdf

El teorema de Thévenin es un método sencillo y poderoso para resolver problemas de circuitos eléctricos. Consiste en simplificar un circuito complejo para determinar la corriente y tensión entre dos puntos específicos, sin necesidad de analizar el circuito completo cada vez. El teorema de Thévenin establece que cualquier circuito lineal formado por elementos pasivos o activos puede ser sustituido desde los puntos externos A y B por un generador de tensión VTh (tensión de Thévenin) y una resistencia en serie RTh (resistencia de Thévenin). Esto simplifica significativamente el análisis del circuito al permitirnos aislar la parte relevante para nuestros cálculos. Para aplicar el teorema de Thévenin, primero identificamos los puntos A y B en nuestro circuito. Luego, desconectamos todos los elementos que no están directamente conectados a estos puntos. Esto nos deja con un circuito equivalente formado por la tensión de Thévenin VTh y la resistencia de Thévenin RTh. Imagine tener un circuito complejo con múltiples resistencias y fuentes de voltaje, y necesitar saber la corriente que fluye a través de una cierta resistencia. Usando el teorema de Thévenin, podríamos aislar la parte del circuito relevante para nuestros cálculos, determinar la tensión de Thévenin VTh y la resistencia de Thévenin RTh, y luego calcular fácilmente la corriente que fluye a través de la resistencia en cuestión. El teorema de Thévenin es una herramienta fundamental para los ingenieros eléctricos y electrónicos. Simplifica significativamente el análisis de circuitos complejos, facilitando la determinación de corrientes y tensiones en puntos específicos del circuito. Al entender y aplicar correctamente este teorema, se puede resolver un amplio rango de problemas relacionados con circuitos eléctricos de manera eficiente y precisa. It will be easier to find the values of tension and intensity of any resistance connected to this circuit. And how do you get the Thevenin equivalent circuit? That's what we'll see in the next section, Thevenin Equivalent Circuit. We'll see how to obtain the Thevenin equivalent circuit from a circuit. The Thevenin equivalent circuit consists of obtaining the Thévenin voltage VTh and the Thévenin resistance RTh. Let's see how to get each one with an example. In this next circuit, we have to find the current and tension of R for when R is 10 Ω, 15 Ω, and 20 Ω: First, we isolate the circuit to which we want to apply the Thevenin equivalent circuit, disconnecting the resistance: Now let's get the Thévenin resistance and voltage. Thévenin Resistance To find the Thévenin resistance, short-circuit all the source tensions, that is, replace them with a conductor. The circuit remains: Now we have to reduce the circuit by associating resistances in series and parallel. The resulting resistance will be the Thévenin resistance. We start by associating in series the resistances on the left branch: We get: Then we associate the two resistances in parallel from the vertical branches: We get: And finally, we reduce to a single resistance by summing in series those that remain, which will be the Thévenin resistance: Thévenin Voltage Now let's calculate the value of the Thévenin voltage, which corresponds to the tension between terminals A and B: We apply Kirchhoff's second law to the unique loop we have, which is where the current flows, since by the branches connected to nodes A and B there is no current flow, as they are open-circuited. We get: Operate: And solve for the intensity I: The Thévenin voltage is equal to the tension between points A and B and this is equal to the tension in the 3 Ω resistance multiplied by the intensity plus the generator's tension: Replace the intensity with its value and operate: The equivalent circuit is as follows: Connect this circuit to a resistance of 10 Ω: Calculate the current: And the tension in the 10 Ω resistance: Now connect a resistance of 15 Ω: Calculate the current that flows through the circuit: And the tension in the 15 Ω resistance: Finally, connect a resistance of 20 Ω: And calculate the current that flows through the circuit and the tension in the 20 Ω resistance: Thevenin theorem applied to any circuit element So far, we have seen how to solve electric circuits by applying Thévenin's theorem, so that the load is connected at one end of... We need to find the Thévenin equivalent circuit for the remaining part of the circuit after disconnecting the load. However, what if we want to apply Thévenin's theorem from a resistance that's not at an extreme end of the circuit? Can we apply Thévenin's theorem on any branch in the circuit? The answer is yes, and we'll see how it can be done with a solved exercise that says: Given the following circuit, determine the current flowing through resistor Rc, the voltage across its terminals, and the power dissipated, applying Thévenin's theorem. We start by disconnecting resistor Rc from the circuit and leaving nodes A and B open-circuited: In this circuit, we'll find the Thévenin equivalent circuit, obtaining the Thévenin resistance on one side and the Thévenin voltage on the other. To calculate the Thévenin resistance, short-circuit the voltage sources: In this case, we need to calculate the Thévenin resistance from nodes A and B. What does that mean? It means these branches are considered dividing the circuit into two parts that can only be connected in parallel. We would have to find the equivalent resistance on the left side of the nodes and then the equivalent resistance on the right side, and finally associate both resistances in parallel. Let's see it more clearly: We start by finding the equivalent resistance on the left side of the nodes A and B. Remember that when we have a resistor in parallel with a short-circuit, like this: The result is a short-circuit: So our circuit becomes: Thus, on the left side, we're left with an equivalent resistance of 10 Ω. On the right side of the nodes, we don't need to do anything because we only have a 20 Ω resistor. We therefore have two resistances in parallel, one on each side of the nodes. To make it clearer: We associate both resistances in parallel and calculate their value, obtaining the Thévenin resistance: Once the Thévenin resistance is calculated, we continue calculating the Thévenin voltage. We use for that the original circuit after disconnecting the load: Since there's no current flowing through the branches going towards nodes A and B, we can eliminate those branches and place nodes A and B on the connection points of those branches, like this: We apply Kirchhoff's second law, so we establish the direction of the meshes: The equation we obtain in the left mesh is: I1, I2 e I3: Nos dan los valores de I′ y I″: Finalmente, obtenemos la tensión de Thévenin aplicando Kirchhoff en A y B y la rama derecha. El circuito equivalente de Thévenin es: Le conectamos una resistencia de 20 Ω a este circuito. Calculamos la intensidad que recorre el circuito, luego la tensión en la resistencia, y finalmente la potencia disipada por ella. La electricidad que circula por el circuito y la presión entre sus terminales es: ¿Necesitas ayuda con electrotecnia y matemáticas? ¿Quieres saber algo más sobre cómo entender estos temas? 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